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16. Abstract

In recent years the use of large diameter CIDH pile supported footings to support bridge super structures has become common. The seismic response of bridge super structures supported on such footings relies on a moment-resisting connection between the piles and pilecap.

There are, however, uncertainties about the force transfer mechanism from column to piles in the 4-CIDH(Cast-In-Drilled-Hole)-pile-supported-foundation system. When piles are in the elastic state, the distribution of moment and shear force in the footing and in the piles can be significantly affected by the axial force in the piles, due to the variation of pile bending stiffness with the axial load. Furthermore, the influence of the three-dimensional geometry of the foundation on the shear direction of elastic pile can also affect the magnitude of the bending moment acting on the piles. Although the foundation system is usually designed to remain elastic during the earthquake, plastic hinging in the piles may not be avoided during a severe earthquake. Recent research on Knee and Tee joints of bridge bents indicates that significant amounts of joint reinforcement may be necessary in the pilecap joint regions.

To investigate these issues, two large-scale models of full Column-Pilecap-Piles assemblages were designed and tested under simulated seismic loading. The test units were designed according to state-of-the-art seismic design requirements. The first test unit contained conventional reinforcement while the second test unit contained headed reinforcement. Following the observed behavior of the test units, the pilecap force transfer mechanism is further investigated using a simplified foundation model similar to the test units. Consequently, a simple procedure is developed for seismic design of the 4-CIDH pile-supported-footing system.

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Seismic Design, Seismic Performance, CIDH(Cast-In-Drilled-Hole), Pile, Pile Supported Footing, Pilecap, Deep Foundation, Column-Pilecap Joint Mechanism, Headed Reinforcement.	Unlimited

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